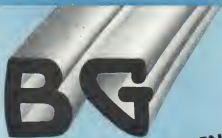


# AVIATION WEEK

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APRIL 17, 1950



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## WHO'S WHERE

### In the Front Office

Donald M. Parker has been named contract manager for Pacific Aerospace Corp. He has been associated with aerospace for more than 30 years, including service with Pacific Alaska Airways, Wright Aeronautical, Republic Aviation, and TWA. His latest position was as general sales manager for Piper Aircraft.

W. E. Miller is now moving out to try and general manager of Pacific Aerospace Corp. and will work with the company's Burbank, Oakland, Kansas City, London and Amsterdam divisions. He was formerly general manager of the industrial engineering dept. and more recently on the staff of the Los Angeles Air Corps.

Kenneth W. King has been appointed Eastern Air Lines' general traffic manager succeeding R. L. Thomas who is leaving the airline. King's out will be Frank Sharpe. King had previously been with American Airlines since 1934 serving in Washington, Chicago and New York. In the latter city he was in charge of AA's domestic and overseas international and ticket transfer system. Sharpe had been with AA since 1941 and had been responsible for company's year-end negotiations.

Capt. Lewis W. Dismore has been named operations manager for National Airlines. He joined the airline in 1945 as an aircraft engineer and operations coordinator, rising to act operations manager, the position held prior to his new position. He also holds an airline pilot's rating.

Kenneth W. Smith, Jr. has been made vp of Macintosh Power Systems and Ralph Cordell, vp and manager of the company's Greenboro-High Point base, has been named to the base. Smith has been manager of San Jose since 1949, having served 1945, being in charge of Royal Palm Air Force Station during 1949.

### Changes

Robert A. Wells has been made chief tech and laboratory engineer, machine installation, product development and product engineering of Gulf Oil Corp. — Ralph L. Brown, former chief engineer for Wright Aeronautical, has been made company's sales engineering rep at Dayton, Ohio. — John E. Rasmussen has been appointed to sales staff of General Aircraft Supply Corp., Detroit.

### Honors and Elections

John A. Smith, corps sales manager for Continental Air Lines, has been elected chairman of policy committee at an airport division of Air Transport Association, and Russell Leffler, United Air Lines' mail and express unit, has been made chairman of ATA's operating practices committee of an airport division.

## INDUSTRY OBSERVER

► Air Force is changing the designation of an intercepter version of the Lockheed F-94H to F-97, and Pentagon sources say it will be something to watch in forthcoming fighter contracts. F-97 is powered with the Pratt & Whitney J-45 turbojet rated at around 8000 thrust lb, with afterburner, and has a very thin, straight wing, which gives it performance right up to the edge of Mach 1, if not beyond it. Thus the basic Lockheed F-94 is getting yet another lease on life.

► Competition has not lost work for the preproduction contracts for the G5 Martin 40-4 transports which are under only by TWA and Eastern Airlines. Engineering income was expected at the weekend with these competitors—the French-built Stratus system, Airbus and the Standard division of United Aircraft Corp.—all trying for the business.

► Seattle pressure on the USAF to keep military contracts in the Boeing plant there may result in a revision of the C-97 military transport contract, now scheduled to end this fall. A recent West Coast trip by Sen. Dan Rosten Shepherd to study the Seattle situation reportedly has resulted in a Pentagon report that such contract for 57 additional Stratus highspeed Boeing could keep the Seattle plant going at a 10,000-employee level through 1951.

► New developments for aircraft include the following changes: Spec. No. ANF-35A (Gladié JP-1) is now MILF-562A, ANF-32A (JP-2) becomes MILF-561B, ANF-46B (anti-submarine engine fuel covering engine ratings of 80, 91/96, 100/130 and 115/145) is now MILF-5572. New reference fuel for jet, MIL-5164 (USAF) differs from JP-3 as that its distillation curve is closely defined and specifications for other properties, such as aromatic and sulphur content and vapor pressure, are given. Additions as well to numerous others. Hydraulic fluid ANO-166 has been re-labeled MIL-O-5606.

► Purchase of two two-engine Percival Prince production type planes by Shell Oil may be the forerunner of additional sales in this country.

► Reports that the Taylor Aerocraft prototype mobile plane had been sold to Goodrich, although widely circulated as the west coast, has been denied by Moulton H. Taylor, designer of the mobile.

► Switching from Ft. Worth to San Diego of the power to install free jet engines in push rear wings on such of Convair's B-56 intrinsically bombards, has provided the San Diego plant with massive success in employment, with approximately 4500 workers needed on the post installation projects.

► Bell Aircraft Corp. has organized the Elm Insurance Co. to handle helicopter hull insurance and re-insurance and other associated aircraft insurance and re-insurance.

► French sources say the Leduc 010 prop-jet back engine experimental plane is being followed by another Leduc model with piston engine, which is expected to attain the phenomenal climbing speed of more than 20,000 ft./min. as compared to 8000 ft./min. already attained by the 010.

► French designers claim advantages over pulsed jet aircraft powered helicopters in the Asol II (SO II) experimental helicopter which compresses air in the ductage, pipes it out to tiny steam-turbine combustion chambers in the rotor tips, where it is fired to produce a reaction thrust from within the combustion chamber. One of the combustion chambers is reported considerably less than that of the engines and pulsed jet similarly installed at blade tips of American experimental craft.

► Goodyear's biggest thing yet, the 52-ft. long "BN" ship, now in construction in the old drydock dock at Akron, is expected to be completed around the end of September. Contract price for the big submersible craft is reported at \$3,378,000.





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**Aviation Specialty Lubricants**

## With Maintenance Bigwigs at ATA Conference



Stas Statos (Western), Ray Dean (TWA) and ATA's Engineering and Maintenance Conference Services, Al W. Dallas, say hello.



A. T. Nofley, Henry Woods and Al Vollenweide (all of CAAL, High Potomac, CAAL) and Steve Ruffo (CAA) talk shop after a session.



Ray Dean (TWA), Wayne Fiedler (American Aviation), Robert Feltner (EAL) and Lt. Col. Robert White (USAF) at round dinner.



CAA's Vollenweide, Wing Comdr. W. T. Goss (BCAF), Sherrill H. W. Kenna (Comair), speaker, Eugene Aubrey Kell.



Lewie Bolot (NACA), Al Heller (ATA), Lt. Col. B. Mayfield (MAF), A. T. Nofley (CAA), Lt. Col. M. C. Bowman (USAF) were among 400 at banquet.



Top: CAA's Woods, Kell, Scott (CAAF) Feltner, Lt. Col. N. S. Wooty (DCAAF).



Bostell's W. V. Simmons gets away with CAA's Kenneth Somers for bad joke, Eds. News, Good Control Airport, is the winner.



Ralph Goss (NWA), R. L. Anderson (CAAF), Charles Dalton (Delta) and G. J. Dye (Delta) gather at party given by TWA.



Conference session chairman at ATA were included W. W. Davis (Boeing), heating, ventilating and air conditioning; R. E. Green (NACA), engines; H. W. Holaday (Western), structure and construction; and J. G. Burger (Pan American), electrical systems.



Other attendees at the ATA meeting were: W. C. Young (Boeing), fuel and oil systems; F. A. Humphrey (TWA), hydraulic and vacuum systems; R. L. Anderson (Chicago & Southern), vacuum systems; and Robert Sisk (Eastern), propellers.

## Airlines Want Simplicity and Ruggedness

Engineers at ATA meeting decide those two factors hold key to cutting costs.

New simplicity of design and ruggedness in operation of civil transports, their control systems and components were the two underlying themes of the recent 1950 Air Transport Association Engineering and Maintenance Conference at Kansas City.

Those emerged from three days of discussion by top-flight airline engineers, men and women, engineering personnel at the two most important factors in reduction of maintenance costs and increase in performance dependability.

The increasing stress on these engineering problems was apparent in the second high attendance of 571, including more than 115 representatives from 24 U. S. scheduled carriers and 18 from 18 foreign airlines.

Other delegates—also present in larger numbers than before—were participants from government and military agencies, airlines, engine and propeller manufacturers, and producers of air craft accessories and equipment.

Proceedings of the 1950 meeting followed the successful pattern established in 1948. The 650 overtime sessions introduced in ATA by the airline for conference discussions were confined to 467 and grouped into ten general subjects.

Manufacturers' spokesmen generally exhibited a willingness to study any

valid suggestion, but in some cases indicated that certain requests were economic or "unrealistic," substantially large expenditures to fill the demands.

For example—Specifically, propeller manufacturers indicated they could not produce a stronger unit without expending themselves to calculate from the airlines for making too heavy a product.

Similarly, vacuum tube manufacturers contended this, was forced to proceed with certain trends production of the "ruggedized" tubes demanded by the airline industry because of abnormally high cost of development and unworkable rate of rejection—sometimes as high as 60 percent of newly manufactured tubes.

Scope of the discussion was apparent in the ten subject groupings. Topics included ground servicing and shop equipment; maintenance; fuel and oil systems; instruments; propellers, electrical systems; engines; structures and controls; hydraulic and vacuum systems; heating, ventilating and air conditioning; and avionics.

On-the-spot observations could result in these conclusions among others, in their respective categories:

- **Underground shop servicing equipment** is proving easier and less expensive to maintain than conventional mobile equipment.
- **Integral fuel tank sealing** is not the

problem it used to be and the new bladder-type fuel tanks are proving effective.

- **Electrically driven gyro instruments** are being more widely accepted than mechanical.

- **Increased propeller weight** appears far more effective way to reduce blade and hub failures and cope with hitherto underdeveloped vibration problems.

- **Electrical installation standardization** has been agreed on by airline manufacturers through the Aircraft Industries Association, as the first step toward standardization of aircraft manufacturing.

New emphasis is being placed on design criteria for electrical systems as they are called on to perform greater and more complex functions.

- **Two major engine problems**—local fueling of static plugs and oil sludging—are among solutions.

- **In aircraft structure maintenance**, larger airlines have determined that "progressive overhaul" provides the effective means of maintaining a uniform fleet.

- **Nonflammable hydraulic fluid development** and its impact on increased safety commanded the attention of all airlines.

- **Distribution of cabin air** to provide maximum comfort to crew and passengers is a continuing problem in large modern transports.
- **Ignition trouble-shooting** and costs can be materially reduced through the use of airborne ignition analysis.

Except for the session on ground servicing and shop equipment and that



Phil Dorn (left), Keith Whitney (center), Eugene Stoddard (right) are, Andy Karl.

(From left, Kenneth J. Boudreau (right) are shown.)

on propellers, each of which ran three hours, topics arrived in hours of the session. Three subcommittee sessions were held on each of the three days of the conference, Apr. 4, 5 and 6.

Stanley R. Sklar, vice president—maintenance and engineering at West Air Lines, was elected chairman of the 1951 meeting, which will be held in Chicago.

### Ground Servicing and Shop Equipment Maintenance

Methods for maintaining ground equipment used consistently among the various airlines.

Some, such as Trans-Canada Air Lines, have put out a ground equipment manual which sets up the standard for line stations.

Others, like Northwest and Boeing, send out traveling mechanics at regular intervals to service ground equipment. Many airports, such as Pan American's facilities at local airports to keep standard station equipment as simple, while specialized units are overloaded in their own shops.

It was generally agreed that control and control of shop equipment maintenance at large stations is more concerned than maintenance by operating lines during normal week long periods, since it permits greater continuity of work. Pan Am upheld preventive maintenance for shop tools, indicating that, as its experience, tools were kept in better condition and equipment replacement was substantially reduced.

- **Accidents**—On reduction of losses due to mechanical accidents and revenue maintenance.

- **Shell Oil Co.**, estimated that 25 per cent of all maintenance costs were directly attributable to improper operation and negligence.

- **United Air Lines** has determined that the majority of its accidents occur during the "universal" shift.
- **American Airlines** noted that when supervisory employees operated equip-

ment, maintenance costs dropped to normal.

- **Most important single factor** in reduction of maintenance costs and equipment accidents is the establishment of a comprehensive course of instruction for all operators of mechanical equipment.

- **Underground Facilities**—Underground shop servicing facilities received vigorous discussion. Most of the airlines believed that such facilities are more practical and definitely more economical than above-ground, mobile equipment.

NWA, which has studied the problem extensively stated that, although 100 percent reliability has not yet been obtained from underground maintenance, definite economies have been realized over their use in the conventional mobile fashion.

Underground fueling pits, NWA said, are considerably easier and less expensive to maintain than fuel tanks. A Gulf Oil Co. representative pointed out that pit equipment could be depreciated over twice the period of mobile equipment charge-off. EAL felt that the cost of fuel pits was considerably less than that of fuel tanks.

United Air Lines, however, pointed out some of the disadvantages of underground camp servicing facilities used and noted economies in the pits, during a difficult time in winter conditions, units tend to become inoperative through winter freezing and the pits, as a whole, are difficult to maintain. UAL, however, said that the correct pits are important.

- **For Research**—On innovation and/or removal from service were discussed by several airline engineers. Some preferred a 1:2 solution of glycolic glycol and water spread on the wing and engine nacelle surfaces. Although this method is reasonably effective, they said it is expensive, and has the disadvantage of making the surfaces very slippery and hazardous to mechanics and loading personnel. Boudreau said it was alcohol with excellent results.

TCA, however, was with alcohol, then treated it with a thick slush with a paste of rubber hose. An alcohol wash will remove noise on without difficulty, but is ineffective against glare.

Little agreed was given to the accumulation of potentially inflammable fuels in sensitive areas and engine compartments and the consequent for local Representatives agreed with a suggestion from the fact that this matter is a good enough situation.

TCA has found that a light coating of oil is beneficial in preventing ice from forming on the external winging fittings of aircraft. FAA is satisfied with a solution of ethylene glycol and water, used in conjunction with wing covers. The RCAF stated that bonded nylon is the most suitable material for the cover since it resists deterioration well, was light, easy to handle and could be stored in a small space.

General Gooding-TCA gave the following specifications for design type ground air conditioners which they have recently put into service in their DC-4s with considerable success. It provides 15,000 cu ft of refrigerant at 2400 cfm with a pressure of 10 in. of water at the end of the duct. The unit costs \$12,500 Canadian, weighs 6000 lb., and measures 5 x 6 x 12 ft. The maintenance costs were said to be extremely low.

United Air Lines reported success in its experiments with painting the upper portion of the landing wheel in order to reduce interior cabin temperatures.

### Fuel and Oil Systems

Sealing integral fuel tanks on more modern aircraft built at the Consolidated Aircraft Co., Concord 240 and DC-6 has not produced any serious problems. But sealing systems on DC-4s and Model 497 Cessnas, designed at last year's meeting, still are being studied by the airlines.

Many airlines, not yet finalized by the industry, is whether to patch fuel tanks when necessary, or to strip and reseat them which leakage becomes excessive. The latter process is so expensive that maintenance is probably well be the decision in most cases.

For example, one airline estimates the cost of stripping and resealing the tanks of a DC-4 is \$10,000.

- **Equipment** to produce the job—\$75,000.

- **Labor and material**—\$10,000.

Told it approximately \$24,000, not covering cost of immobilizing the aircraft, it was also brought out that it would not be the necessity of accomplishing all structural repairs to the tanks prior to sealing. In the last analysis, it was felt that if the tanks were structurally sound, chemically clean, and this sealing were well done,

a strapping job could be worth while due to the inherent subsequent maintenance.

► **Materials**—Most airlines are reluctant to use any of the newer tank sealing materials. This is due to a difficulty with edge in cutting products. One of the most commonly used is Messers Messing Compound ECI 881 807, as some designers being that it is difficult to apply correctly.

It was pointed out that a transducer or transducer compound would provide the definite advantage of allowing the mechanic applying the material to see any air bubbles or other defects in the seal, and correct them on the spot. Unfortunately, carbon black powder the tank builder would know, which makes the development of a good transducer product difficult.

► **Control Oil Voids**—One of the first points brought up during the discussion of oil systems, was the oil bulk installation on the Lockheed Constellation. Originally the Constellation was equipped with a late aluminum of tank.

Lockheed has issued a service bulletin describing how inspection could have a fire-resistant wrapping installed on tanks. While the material provided excellent fireproofing capability, operators reported the fire that the covering would make the detection of cracks and leaks extremely difficult. To this, Lockheed replied that the covering damped vibration sufficiently to preclude the tank's engine under normal use.

A second question was the apparent necessity of inspecting the coating at intervals in order to inspect for corrosion. If the material were replaced after such interval this method of fireproofing eventually would become extremely expensive.

The Lockheed representative stated that his company had recently found it desirable to design a new oil tank allowing for possible future expansion and simplification manufacturing. The new tank out of stainless steel, which would make future fireproofing problems.

## Propellers

Basically the propeller construction reduced some of the material advantages of the steel or aluminum blade.

Many improvements have been made in both brass, but neither has been preferred. One of the principal problems with the Hamilton Standard steel has been delamination. To correct this, the metal covered was to be subjected to many times as increase, provided the balance of the propeller is not disturbed. Furthermore, delamination is a critical in the outer 35 in. of the blade, and it is critical on the H37 blades. Delamination of the Camber/Electric

propellers brought out the fact that as the weight of the steel increases, the blade delaminates. But obviously there is a limit to this method of reducing propeller problems.

► **Maintenance**—Discussion of propeller balancing equipment revealed that most maintenance people preferred the Sellen or Messer Fine Instrument ball system to the conventional vertical equipment. Among the advantages cited:

- **Less damage to the blade edge**
- **Reduction in handling of the propeller**
- **Extreme accuracy**
- **Extensive accuracy**—The Messer Fine Corp. of America has developed a method of applying a protective wax coating to the leading edge of propeller. Airlines who had used it commented favorably.

## Structures and Controls

738T showrooms has given better results than reported, both from the point of view of structural endurance and resistance to corrosion. The principal problems encountered with this alloy have been lack of denting, drilling and bending heavy plate sheets without leaving a mark.

These difficulties are particularly evident when repair have to be made in the field.

For this reason it is common practice to fabricate new parts between 248T and late metal are made. American Airlines says 348T repair with 738T at the next major overhaul while PAA considers all 248T repairs on permanent, provided they are not too extensive. It was generally agreed that the cost in weight loss in fabricating 348T for 738T was insignificant.

► **Door Protection**—Continental Airlines selection to the possibility of the Metropolitan Air Parts Air Side Door opening is a light to be taken into account. This door is attached after takeoff and removal before landing. Should the door become unbalanced accidentally in flight, the door shows it is open once six inches.

WAL has had excellent results from spending the door hydraulically, although continuously opening and closing the door during the water requires considerable hand pumping by a crew member to supply pressure for the door's operation.

► **Corrosion Problems**—To test corrosion is difficult to such an area, it is first necessary to make the structure accessible to a chemical attack. One operator suggested that an effective procedure was to treat the surface with aluminum dichloride followed by one or more coats of zinc chromate.

Clas Nikolaev was mentioned as being a chemical inhibitor on advantage being that maintenance peo-

ple could access through the material to determine whether corrosion was occurring on the treated surface.

One airline stated it covered the entire surface with a clear plastic spray which had given good protection and reduced cleaning time by one third. Drawbacks were that the plastic coating rubbed off easily and tended to be yellow with time.

A representative of Alaska pointed out that while corrosion could not occur without a lead or heat-treated, but will not corrode unless the corrosion action is directed along the weld surface. The best general procedure to combat corrosion was to provide a maximum number of drain holes and adequate ventilation.

All airlines are experiencing varying degrees of corrosion around the fuel tank area. Some are installing coils and Duranite, while others are considering the use of zinc shrouds steel to combat the problem. Corrosion repair operations in thermal loading also takes in an effective test exchange.

► **Control Surfaces**—Most airlines recover fabric control surfaces every 24 to 36 years, and only on the inspector's option considering the condition of these surfaces.

NWA has obtained good service out of nonconditioned control surfaces and has determined that the cost of recovery is more than it is to replace 10 percent of all new bearings.

Generally speaking 8000 hours is the expected life of control cables.

## Hydraulics

It was apparent that a considerable amount of development of nonflammable fluid has been accomplished without sufficient regard to defining exactly the quality of being "nonflammable." NACA advised commercial companies interested in developing such fluids to pay into the basic work of its feasibility to establish precise criteria.

Present specifications for nonflammable hydraulic fluid are unsatisfactory to the extent that they allow a water content. While it is soaked up as evaporated it leaves an inflammable residue. Furthermore, the fluid are excellent electrical conductors.

► **Hydrolocks**—Constant drawbacks to the hydraulic type of mechanism are the constant danger to the presence of water (35 percent in the case of U-4) and questionable integrity. The H-3 fluid is in agreement over the U-4.

Sherlock developed jointly by Messrs. General and Douglas, has been used successfully by UAL in cabin

space heater driven. The only fluid considered that is a real danger and that is not acetone. UAL also converted the main hydraulic system of one DC-4 to Sherlock, the job taking 900 man hours. The fluid was later removed and put in a second DC-4. As a result of this experience, UAL believes that the time required to convert to Sherlock could be reduced to 500-700 man-hours. Capital will use Sherlock in its newly purchased planes.

A spokesman for KPM (Standard of California) suggested a two-step development plan for nonflammable hydraulic fluids. The first, or interim plan would be to develop a fluid which is partially nonflammable. This fluid would require little or no change to existing hydraulic systems and into the final phase would be the development of a completely nonflammable fluid, which is of sufficient weight require certain changes in hydraulic systems, especially in tanks to make it use practical. KPM has currently applied a hydrostatic fluid that is truly nonflammable, the representative said.

## Ignition

Sperry ignition systems, which were discussed at length during this week's meeting, have been tested and have given excellent results. PAA, for example, has reduced premature spark plug removal from 5.6 to 2.5 per 1000 engine hours. This represents a steady saving on the mean close of 7700 per aircraft (Boeing Stratoliner). The cost has proved to be accurate and it requires very little maintenance.

The General Electric high frequency ignition system will soon go into service test. Laboratory measurements indicate that spark plug life in the order of 1100-2000 hr may be expected. It also promises to fit badly needed plugs in high altitude. The drawback is a special type of plug is required which, under low production rates, costs some \$1.00 per unit, which is more than three times the cost of present spark plug.

The General Electric ignition system has been in use for about two years. It has the advantage of accommodating currently available types of spark plugs, the reason rate of which has been considerably reduced when used with this system. A more practical test for spark plugs, one which will more truly duplicate actual operating conditions, is the great need for operators, the engineers agreed.

## Engines

UAL and PAA, operating the Pratt and Whitney R-4360 engine, the Stratoliner's loss an overhaul period of 600 hours, while NWA engines

have an overhaul period of 400 hr.

- Number of accidents per 1000 hr of engine operation
- Reduction gear, 40%
- Vibration, 45%
- Valve guides, 45%
- Cylinders, 45%
- Combustion, 45%
- Master rods, 45%
- Average, 45%

The main critical opinion on this engine has been given in the B-44 and B-2.

One of the most important requirements made on the Wright R-1330B01 engine has been metal plating the upper piston ring grooves, which has shown the piston to operate on full time more than previously.

No significant difference was noted between collector rings made of stainless steel or Inconel, although NWA and Douglas did capture some preference for the latter where extremely high temperatures were encountered.

TWA, UAL and AA have reached an agreement to establish new criteria for inspection items subject to the approval of the CAA, overhaul periods of engines, engines and components will as large as governed by Safety Release 267 but rather by a formula predicated on accumulated past experience. Evidence of overhaul time a statement will also be eliminated. The plan will be ready for implementation within 30 days and will run nine months.

## Electrical Systems

Increasing emphasis is being placed on electrical problems due to the increasing structural demand as exemplified in the Boeing Stratoliner. The electrical system was devoted to almost none more time to engineering than has a maintenance point of view.



## THUNDERBOLT GETS EXTRA REACH

Two additional 110-gal fuel tanks are mounted on bomb racks under the wing of the Republic F-44C, increasing the craft's combat radius from 450 to over 600 mi. With this extra capacity of 220 gal, the Thunderbolt now is probably the farthest-ranged jet fighter in the world.

Top engineering personnel from the large aircraft manufacturers participated in talk of design policies of modern electrical systems.

Particular interest was shown in protective equipment such as overvoltage protection, ground fault protection and other methods of guarding the aircraft, should one or more circuits fail. General Electric, Kalmann and Jack & Hinz are all have developed over voltage protection systems.

► **Standard Published**—The Aircraft Industries Assn. has recently published a standard for the installation of electrical systems. This is the first time that aircraft manufacturers have agreed on electrical installation standards and the standard organization is expected to prove of enormous benefit to the industry and to the airlines.

The industry will continue to these standards gradually as their fleets upgrade major overhauls, while the Martin 404 will be the first aircraft whose general design philosophy will abide by these—except for individual specifications of packaging arrangement.

Electronic equipment has given satisfactory performance, however, there is a definite need for more types of "buggaloos" rather so that the safety of an entire aircraft will not be jeopardized because of the failure of a single element in an electronic device. The importance of this point was underlined by the fact that one airline replaced some 15,000 vacuum tubes in one year's time.

Manufacturers of vacuum tubes stressed the expense and difficulty of developing "buggaloos" rather the airlines, however, stated that the more between them the number of types being manufactured, and expressed willingness to try tripled cost of such units in view of the fact that laboratory tests indicate that the life expectancy of a





Instrument broken at conference was headed by Marvin Whitlock of American Airlines. Later E. S. Hume (left), chairman of action on ground warning and shop equipment, was not available for group pictures.

regretted, tale could reasonably be set to ten times that of a conventional tube.

#### Experiments

A step forward over last year's position of the airlines with respect to microelectronics is their increasing acceptance of electrically driven gyro units, primarily because of the reliability they have shown.

Gyro instrument bearings still get considerable trouble, and the gyros and their controls for them are expensive. Manufacturers of the latter state that prices will be reduced soon. Transistorized regulators, although improving in reliability, still have much to be desired.

## IAS Meeting Airs Transport Problems

Electricity of the Bureau of the Budget was expected to be hot work for the proposed \$12-million program for flight testing and certifying new jet transport prototypes under Department of Commerce supervision.

Testable called for construction of tests embodying the program, initially to be done at Ames and Santa Ana this week, with the Transport Administration given light for passage.

Tests of the program in economy mandated Congress still appeared uncertain, in view of previous criticism by Senate and House leaders (Aviation Week April 30).

Support of the Aircraft Industry Act, was thrown behind the \$12-million testing program last week by John DeWitt C. Ramsey, AIAA president, who said the legislation was "far from a complete solution to the prototype problem but should be of real help to bring the day when American turbo-prop engines are available, and should supply data of measurable assistance to design of a turboprop engine."

Adm. Ramsey, speaking before the Washington section, Institute of Aeronautical Sciences, insisted that the key phase of the AITCA all-aluminum flight control program would have to be conventionalized, later or five years hence, before turboprop aircraft can be developed safely in any considerable numbers as air transport.

Another speaker at the IAS meeting, Rear Adm. L. B. Richardson, research and development director of Fairchild Engine and Airplane Corp., asserted that "turboprop" shows well today in the airframe as compensator for passenger and cargo operations, comparable

to Pullman cars converted for freight. Condition is highlighted, he continued, by the safety problem posed in a multi-engine aircraft to be built (Operations Section) in which conventional-type transports will be able to carry only 10 percent of the unitary equipment scheduled for aircraft, while 90 percent must be carried in various cargo planes.

## Four-Engine B-47C To Have More Power

A 54,122,617 USAF contract for modification of new B-47C Stratofortress is planned to make a plant which would develop 9500 hp thrust more than present version, with two jet engines.

The two-engine version now in production is the world's largest bomber and has a speed of more than 600 mph XB-70 prototype, from which production version was engineered, but now set a transcontinental speed record of 3 hr and 46 min.

Experimental "C" version ordered by Air Force will be powered by two Allison J-35-A23 engines, each developing 9200 lb thrust. Modification will approximately 4 ft of each B-47C per section plane-in to add to existing changes in wing structure. Current production version, engine as C-147C, rated at 5200 lb thrust.

Range of the four-engine B-47C will not be appreciably increased, but added speed will place bomber class in new speed. Air is on attaching methods now under test for production version, if applied to experimental bomber, would give the nation a jet bomber with the range capabilities of its present B-30 aircraft.

Experimental model, designated B-47C-1, not scheduled for production during 1950, the Air Force said.



#### B-36 TRACK GEAR TAKEOFF

The truck-mounted, Convair XB-56 made its first takeoff test landing on its own equipment on a PT. Wright test facility last week. Photo shows the plane

also takeoff with nose track gear already retracted and at the beginning of extension for the landing gear. That is the position was reported in AVIATION WEEK.

April 30 (cont.) Production B-56 contract is to be equipped with the so-called "quickie" for the landing gear. That is the position track gear will be ordered into production.

## Plane Contracts Total \$1.4 Billion

Air Force spends \$1.2 billion in fiscal 1950 for 1250 aircraft, and Navy awards are put at \$234 million.

By Ben S. Lee

AN FIVE THE week disclosed details of an 1950 aircraft procurement program under which it will purchase 1250 aircraft at an estimated total of \$1,201,200,000. Under value of 1949 program covers overall contract data and aircraft procurement handled equipment.

Navy procurement of fiscal '50 procurement last week included only the awards made to private contractors. Navy awards contracts under program in total \$234,927,263. Total allocated by Department to Navy for purchase of aircraft and government furnished equipment in 1950 is \$4,900,000,000.

Boeing Aircraft—Boeing Aircraft Corp. USAF contract for 1950 fiscal year total contract awards of \$350.4 million. Contract for \$300.6 million in deliveries for purchase of B-47 Stratofortress and \$13.8 million is awarded for purchase of C-97 Stratofreighter.

The latter contract will keep Boeing Seattle in business for at least another year. It simultaneously requires USAF's attention of winging to heavier low engine power for MATS aircraft delivery.

Cessna Second—Consolidated Vultee came out in second place in USAF fiscal '50 procurement with contracts totaling \$277.6 million for the purchase of B-36 bombers, and the two-engine piston engine trainer T-29. B-36 contracts total \$267.6 million and the T-29 contract total \$9.9 million.

North American—North American Aviation is in third place dollar-wise this year and received contract awards totaling \$180.9 million for the purchase of F-86 Sabres and a later modification of the F-86 redesignated F-98, plus a number of single engine T-28 trainers. Specifically, North American received contracts totaling \$184.4 million for purchase of the F-86, \$130.9 million for F-98 jet fighter and \$15.6 million was allocated for purchase of the T-28.

Lockheed—Lockheed Aircraft was fourth in fiscal '50 procurement with contract awards totaling \$146.8 million. Sum of \$120 million went for purchase of the P-80 jet fighter for the purchase of the two-place T-33 jet trainer.

Boeing Transports—Douglas Aircraft also placed a contract for \$14.5 million for the purchase of C-124A four engine transports. It is the only other heavy transport ordered (for 50 funds).

Packard Aircraft received contracts totaling \$90.6 million for purchase of C-119 Packard-Boeing, heavier con-

tract version of the C-57. Convair was awarded \$73.8 million for the purchase of two-engine B-36, designed previously for air transport service.

North American Aircraft received contracts totaling \$61.8 million for F-86 Sabres all-weather jet fighter. Republic Aircraft received contracts totaling \$17.4 million for purchase of F-84 Thunderjet fighters.

Fiscal contract awarded by USAF from fiscal '50 funds was made to Fairchild Aircraft Company, \$9.3 million following a recent helicopter competition, for purchase of six-place H-13 two-engine helicopters.

Engineering Corp. was high bidder in the Navy 1950 fiscal year procurement with \$55.2 million in new business which includes \$57.1 million for Perfor P-39 jet fighters and \$1.1 million for six-engine attack planes.

Douglas Aircraft Co. was second in Navy procurement with \$30 million for F3D night fighters, and \$57 million for A-1J attack-torpedo bombers.

McDonnell Aircraft Corp. was awarded contract for F3H jet fighters totaling \$34.5 million, to take their

place in the Navy contract awarded Lockheed Aircraft Corp. for \$21.4 million in contracts for construction of production of its F2V Neptune long-range patrol planes, and \$1.1 million for its two-place jet trainer equivalent to the USAF T-33.

Grumman, L. Marine Co. secured contracts for \$12.3 million for the F9M. North American Aviation secured a \$12.6 million contract for the AJ-4 attack plane.

Glenn Wright division of United Aircraft Corp. was awarded a \$7.9 million contract for F4D night fighters.

Boeing Helicopter Corp. was the only Navy helicopter contractor, with \$3.7 million contract for H-19 ship-board helicopters.

Data Delayed—USAF had planned to release 1950 fiscal procurement data nearly three months ago but disclosure of the information was withheld by Senate. Repeatedly at Navy request to send a "waiver" completion special aircraft procurement statistical data could be worked out. Navy strongly objected to release of any form of procurement information stating that it was extremely difficult to prepare comprehensive figures to USAF programming.

Last week Navy made an attempt about time as its stand and released the information while Air Force procurement was still shrouded in secrecy and urged as disclosure and type as a result of the Navy mission.



TURBODYNE ON TEST STAND

First test stand photo of the XT37 Turbine engine propeller engine, rated at over 3000 horsepower, test run on the test stand. At test time, Turbodyne contracts called for eight of the jet engines, but contracts followed. Two of the engines have been considered. Another third is approximately 90 percent complete. Original plans called for the engine to be test run as a power installation on a Northrop X-45 Flying Wing, was never carried out. Unless development funds are allocated soon, it will be shelved after qualification tests.

50 to USAF qualification test run for two years. At test time, Turbodyne contracts called for eight of the jet engines, but contracts followed. Two of the engines have been considered. Another third is approximately 90 percent complete. Original plans called for the engine to be test run as a power installation on a Northrop X-45 Flying Wing, was never carried out. Unless development funds are allocated soon, it will be shelved after qualification tests.

1999

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Two 15-foot Model T airplanes by later returned. Steel being converted to the Burbank Airport, West, Minnesota.

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Wing, bringing with it a new peak in engine noise.

P&W's soundproofing program is centered with three major activities:

- **Test Stands**—Soundproofing installations here are of two types.

► **Pretest** before blocks utilize sound-absorbent material mixed with Portland cement. These are installed in layers around the air intakes and discharge ports where exhaust leaves test cells.

The other type of soundproofing consists of five-piece flat metal sheeting sandwiching rock, wool or glass wool. These are installed to build a series of 16 to 24 in. long silencing walls in the intake and exhaust ducts.

Both types give sound-absorbing characteristics that substantially reduce noise level before it leaves the test cell.

A study is now under way on new methods of noise control to handle the higher noise volumes of the jet age and the turbofans. Applications of the laboratory package used in the Will Ross laboratory and more effective materials are planned in a new type test cell silencer now being developed by the International Sound Control Co. of Hartford.

► **Wind Tunnel**—Noise from the United Aircraft wind tunnel has been reduced to a point where it is no longer a problem. This was accomplished by equipping the tunnel's air collector towers with silicon walls of the type used in some of the test stands.

► **Component Test**—Soundproofing used in the gas dynamics lab jet burner test stand and in the component lab consist of long tubular silencers built by the Munson Silencer Co. Hartford. These are large steel cylinder coking a perforated steel tube, with noise between filled with silicon wool. The gas from the test cell is first cooled by water spray and then passes through the central perforated tube and exits and before reaching the water air. The silencers can stand temperatures up to 400 F. P&W says a temperature that can be easily exceeded if the water spray cooling system fails.

► **Wallace Lab**—Soundproofing was one of the last factors in design of the new Andrew Wallace Turbine Laboratory, scheduled for completion shortly. One exhaust from Massachusetts Institute of Technology and the Amos Research Foundation were employed in determining the most effective manner.

One of these studies came a new method that utilized the porous concrete sound absorbent materials can be used on an end-on end-on laboratory of reinforced concrete that helps dissipate the sound by breaking it as it bounces back at each 90-deg. turn. This slows the velocity of the air.

From the laboratory, the gas goes into a large concrete chamber, further

decreasing the noise by expansion. The narrow outlet then built into the upper wall of the expansion chamber are at ground level and after further expansion to sound transmission.

The laboratory chambers are sunk 14 ft into the ground. Material installed in the roof and walls of the 90-deg. turn section is a clay or shale below at 3000 F. wall it leaves chlorine containing many are problems. There are cracks and need with Portland cement and water to form the soundproofing blocks. The air ports in the blocks act as sound traps.

The blocks are resistant to the high temperatures, but must spring, also some reduction, are used to cool the area and prevent heat damage.

► **Ventilating**, **Openings**—In addition to the four silencing chambers at the Will Ross I do each accommodating one of the four main test cells, the ventilating air intakes and discharge ducts are protected with special cells to reduce noise level.

These chambers also use a number of 90-deg. turns to block sound transmission. Each wall consists of a series of vertical ridges with noise of glass wool fibrous mat a 24 in. thick band held in place by checkers were fastened to the noise structure.

Outside walls of all acoustic chambers in the ventilating system and the outside walls of the main laboratory level are constructed of prefabricated insulated metal ridges arranged in a double wall with a foot of air space between the inner and outer walls.

► **Block-Mount** power building and main power plant of main floor. Portland cement and steel (15 in. thick) topped by 24 in. of poured concrete.

Walls and roofs of the test cells are of heavily reinforced concrete for both noise suppression and safety from flying parts or explosions of components.

## Gas-Turbine Metal

Korber, best-represent metal recently developed by Korbermetal, Inc., Latrobe, Pa. will be the basic material in vital parts of a 2000-hp gas-turbine engine being built by that firm to give more power at less weight.

By using the metal in main turbine parts it "becomes feasible to operate at 2000 F. and thereby attain much greater efficiency," the firm states. In addition to having "much less weight than conventional heat-resistant materials," the metal is reported to have high resistance to oxidation, withstand thermal shock and retain "reasonable strength at elevated temperatures."

The company is building the 200-hp metal and will conduct tests as a special service to potential users of Korbermetal.

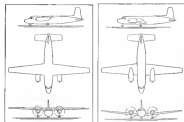
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HIGH WING . . .

LOW WING . . .

Configurations based on ALPA proposals for an interim workhorse replacement for DC-3.

## Pilots' Idea of Short-Haul Plane

Need for DC-3 replacement still has not been filled, ALPA feels, so it offers its own design for job.

Need for a low-density-traffic plane as a replacement for the veteran DC-3 is still apparent to the Air Lines Pilots Assn., despite the various aircraft that have been produced and sold for similar service.

Pondering whether airline "line-theorem" airplane philosophy stems from non-availability of such a plane or whether non-availability is responsible for this philosophy, the organization nevertheless holds that air line pilots have little doubt such an aircraft is required.

They are certain it can be built despite the design and manufacturing challenges which may be involved.

In a recent issue of its "Aviation Pilot," ALPA states pertinent specifications compiled by its engineering and air safety department for a "true workhorse" replacement (Aviation Week, Mar. 27).

Some proposals indicate a close evolution of equipment and operating requirements from the pilot point of view, say substantial increases in a new design would probably draw ALPA criticism.

In solutions, here is what ALPA specifies:

► **Basic**—The configuration, allowing for a passenger-cargo combination, would be a two-engine, low- or high-wing design, selection being made only after a careful study of the many service factors involved. Good passenger volume is considered an important detail.

Size would be predicted as greatest utilization of DC-3 serving and maintenance facilities—hangar space, stairs, loading apparatus—and allow for a two-seat-wide and aisle-access arrangement, except possibly at fuselage rear. Seating capacity would range from 20 to 25. No cabin would be installed in line with propellers.

Though high cruising speed is wanted, it must not be obtained at expense of high maneuverability or low landing speed. A stalling speed of not more than 78 mph is specified as a prime consideration to cope with conditions at small town airfields.

► **Safety Features**—These play a large part in ALPA's proposals. This design, it says, should include these specific features:

- Cockpit arrangement to reduce pilot fatigue.
- Good control in close to stall as is possible.
- Reliable closing for windshield.
- Lights for slowing in on wing landing edge.
- Retractable propeller.
- Fast acting landing gear, which is chain driveable nose unit, and supporting dual tires, with one tire able to support the load.
- Shockoff valve for all fusible fuel lines, located well aft of firewall.
- Accurate detection means for in-flight fire.
- Baggage compartments accessible for combating fire.

- Adequate fuel supply in fusible cells.
- Electrical system allowing more than one energy source for equipment.
- No electrical relays.
- Engine exhaust heat for cabin, cockpit and thrust reversing.
- Space to housing most air turbine installations—cabin, wing, engine, navigation aids, radar, etc.
- Inspection access for checking highly stressed structure.
- Cockpit—ALPA places high importance on cockpit studies to aid in specification of windshield characteristics, instrument and control arrangement, cockpit lighting, and equipment placement.

The windshield study is specified to be full size, allowing true observation. It should face an open zero-impact or nonobstructed oleoform view. Pilot and copilot seats should be at the same height as permitted for those in the forward plane.

Front and side windows should be placed close as possible to pilot—close front windshield giving better visibility during precipitation conditions, close side panels affording good vertical visibility without need for pilot to lean over.

But check is considered to fly the proposed windshield both in daylight and at night, and under precipitation conditions at both these times.

A cockpit is also suggested as the best means of obtaining a cockpit that will permit pilot "to do a good, safe job of manipulating the various controls and reading the instruments . . ." and it is held that a group of airline pilots should review the cockpit study for change recommendations.

Cockpit and instrument lighting, too, is considered to be closely adapted for study by cockpit. It is suggested that the cockpit arrangement be placed at a similar airplane cockpit and checked by night flight.

Holding that reason for rapid and complete suspension of critical mechanical units will prevent fatal accidents, ALPA believes in the utilization of cockpits complete with lines, leads, cables, etc., as an effective coordination between structure, equipment and air-line maintenance equipment.

And coupled with these suggestions, ALPA feels that to bring out design bugs before full production, a maximum of 1000 hours of severe service testing should be accumulated in regular scheduled operations, without passengers.

This service testing program would seem to add considerably to the now generally expended sum in initial proving of transports.

Though there is no question that service testing is required, there is considerable discussion as to value of longer and longer periods.



► A **Kanawha** flight engineer would have to shrink to the size of a gremlin to operate a ram jet. He would have to withstand temperatures from -100F to +700F—pressure from that at 100 feet under water to that at 80,000 feet in the air. On top of that, . . . calculate and react in less than a second to complex mathematical problems.

► Yet the ram jet needs a flight engineer . . . and gets one in Wright Aeronautical's new **power control system**. It performs **unconsciously** the functions of a flight engineer as a modern airframe.

► Actually it does a great deal more, for in ram jet operation, where supersonic speeds prevail, much wider ranges of air flow, temperatures and pressures are encountered than in any piston-type aircraft. The power control checks instantaneous changes in air density, determines the jet's fuel requirements, and actuates the ramjet's controls in a fraction of a second. Result . . . smooth, highly efficient engine performance.

► These power control units—and all other ram jet components—are now under development in Wright Aeronautical's new ram jet laboratory. Here is another indication of this company's leadership in supersonic ram jet research and development. Wright Aeronautical Corporation, Wood-Ridge, New Jersey

**Ram Jets  
get a  
'Flight  
Engineer'**

**CURTISS WRIGHT**

## Rain Damage

Studies with aircraft engine plastics give new erosion data.

One of the major air force problems concerning the use of plastic materials is erosion in engine air intakes, low-pressure laminates with decreasing drag by high-speed flight through air.

This difficulty has been mentioned in the latter part of 1945, on some aircraft operating at speeds of 400 mph, and extended results. But with today's intense flying

as well as higher speeds, the possibilities have become much more urgent.

In 1945, investigations of rain erosion of plastic materials were undertaken under the sponsorship of the Air Force, and these studies are still in progress. While an alternate material has been found, the investigation has been successful in that many vital factors affecting rain erosion have been determined.

Also, it has been found that certain surface finishes give relatively good protection to the plastic laminates and at the same time do not appreciably affect the electrical and mechanical properties of the laminated construction.

► **Test Apparatus**—These are mainly two

types of apparatus for laboratory evaluation of rain erosion. These are the pulsating jet-impingement type and the rotating-arm type system.

The pulsating jet-impingement test consists of water being directed laterally against the specimen. The jet is moved by pumping through an orifice under pressure, from which the speed of the water is calculated. This test, in its present state of development, does not seem to correlate with service tests on electronic and very hard coatings.

The rotating-arm type test consists of a whirling arm rotating under a water spray. Good correlation of results is in relative rating of materials has been found between this test apparatus and service tests.

► **Speed Effect**—Studies show that of the variables investigated, speed has the greatest effect on the rate of erosion of plastics. The rate increases with approximately the 4 to 5th power of the speed.

Thus, it may be seen that while a material may be satisfactory for flight through rain at 200 mph, it may be entirely unsatisfactory when flown through rain at 350 mph.

► **Leading-Edge Curvature**—Shape of the airfoil affects the rate of erosion. For instance, a glass polyester laminate with a leading edge radius of curvature of 4 in. eroded 8 times faster than a flat plate of the same material. For radii of curvature up to 14 in., the slope of the curve for rate of erosion vs. time of exposure is steep.

For radii of curvature 15 in. to 16 ft, the curve slopes is relatively level. This indicates that for least erosion the leading edge should have a radius of curvature of 15 in. or greater.

► **Angle of Attack**—Influence of rain drag upon an airfoil set at an angle of 15, 45, 60, 75, and 90 deg. was studied. Repeated tests showed that 60 deg. was the critical angle. At or above this angle, the rate of erosion was extensive below 40 deg., rate of erosion was considerably less.

Indications are that at angles of impact of 15 deg. or less erosion should not be experienced under conditions of normal traffic.

► **Temperature**—Fifty-Rain temperatures from 40 to 80 F. were found to have no discernible effect on the rate of plastic erosion.

Results details of 5 in./in. and 2.5 mm median droplet size tested a glass polyester laminate 4 mm thick film when tested at 1 in./in. rainfall and 1.5 mm median droplet size, other conditions being the same.

Only a small difference in erosion rate was found by using different glass

inclusions in the laminate, such as 181, 116, or 162. Other fillers, such as Nylon fabric, paper, etc., and resins, such as silicone and melamine, had no appreciable effect on the rate of erosion.

► **Resistance Retention**—But it was found that high pressure resins filled plastic laminates are more erosion resistant than are conventional polyethylene glass laminates.

Also, a void-free laminate has substantially better erosion resistance than a conventional laminate. The so-called void-free laminate is obtained by screening most of the air between the film during lay-up of the polyethylene glass laminate and forcing it a slow rate, to produce a uniform film at comparatively rapid in processing.

A layer of resin on the surface of the material, such as prefilling resin on the mold surface just prior to lay-up of the laminate, also increases the resistance to erosion to approximately the same extent as with the void-free laminate.

As the speed of test is increased, the resistance decreases and none of these materials are regarded as having acceptable erosion resistance.

► **Nepagene Action**—Many sealing materials have been evaluated for rain erosion resistance. Those having the best resistance are chlorinated materials, polyethylene sheet and Nepagene rubber. Also, flame-treated polyethylene appears to be promising.

Of all the Nepagene rubber materials tested, only two gave any degree of sufficient protection to the laminate. These were Gates Engineering Co.'s bonding-type Nepagene, Glaco N-709, and Minnesota Mining & Mfg. Co.'s eroding Nepagene, No. 4776.

It appears that a minimum thickness of approximately 0.003 in. and a good bond of the sealing material to the laminate are necessary for effective protection.

Compared to other materials tested, these two Nepagene and polyethylene give relatively good erosion resistance in laboratory tests at 500 mph.

► **Lab. Service Tests**—For example, as a rotating-arm test using airfoil specimens with about 1 in. curvature, the conventional and void-free laminates erode after approximately 14 min. at 500 mph. The laminates surfaced with 0.010 in. thick, Glaco Nepagene erode through the rotating arm after 15 to 24 min. at 500 mph.

Service tests have shown that the conventional laminated vertical airfoil from top of a set plate eroded through 2 to 3 plies in approximately 30 sec. during 400 mph flight through rain. The void-free laminated set surfaced with 0.010 to 0.012 in. thick Glaco Nepagene suffered no damage up to 16 in. of flight through rain at 400 mph.

(Continued on next page)



**The Engineer says:**  
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**This colorful chart (or ring-binder size tabulation) available on request. Write Department 16.**

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a great, new EDISON  
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The new Edison 22226 Thermocouple Detector is better qualified than the previous model. It further improves the performance and reduces maintenance requirements of Edison Aircraft Fire Detection in aircraft power zone service. Send for Publication No. 2460-6.



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# SPS AIRCRAFT FASTENERS

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**NAS INTERNAL WRENCHING LOCK NUT**  
...a superior safety nut. Saves time 60 to 75%.



**NAS INTERNAL WRENCHING AIRCRAFT BOLTS**

...are made to latest NAS Specification. Bolts are fully formed by rolling after heat treatment, as important UNBRAKO feature. Full range of standard sizes.

FLEXLOC

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... incorporate the famous FLEXLOC self-locking principle and one-piece, all-metal construction. The exceptional reliability of this construction has been proved by the solution of FLEXLOC used in the aircraft industry.

Other outstanding advantages include:  
Maximum tensile with minimum weight  
Approved under latest NAS Specifications  
Large bearing surface  
Positive self-locking—"won't shake loose!"  
Temperature range in  $\pm 500^\circ\text{F}$ .

No special tools needed—use standard 32-point socket or hex wrench. Designed for use in uncramped quarters.  
Sizes from 1/4" to 3/4" NF Thread of Series.  
Send for complete set information.



FLEXLOC

## ONE-PIECE SELF-LOCKING NUTS

The one-piece FLEXLOC is both a stop and a lock nut, due to its resilient segments which lock positively, even under extreme vibration. Torque is unusually uniform—within a few per cent. "This" and "regular" types: NC and NF threads. Officially approved by military U. S. Army, Navy, etc., and CAA for aircraft use.



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See us at Air Expo '66, ASEE, September, April 30-16, Commerce Hall, Philadelphia

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On the same airplane, the leading edge of the horizontal stabilizer was loaded almost completely through the cladding in 36 hr of flight through rain at 400 mph. The horizontal stabilizer is aluminum alloy with aluminum cladding and has a larger radius of curvature than the vertical stabilizer tip.

► **Procedure:** Considerations—Comparing the service results with those obtained on the laboratory testing area tests using the small accelerated specimens, it would seem that the laboratory test is a considerably accelerated condition.

A more simple and rapid laboratory test procedure than the rotating arm apparatus is needed to evaluate the corrosion resistance of materials. For the rotating arm tests to single some materials within a reasonable length of time the speed required is high.

► **Water Apparatus:** A corrosion system not dependent on evaluating the resistance of plastic also has been developed. It is based on an apparatus used to evaluate the resistance of metals to corrosion erosion.

The rapid erosion of the specimens is accomplished with the instrument through violent agitation in water. It is a little magnification oscillator with a power output of approximately 2000. Due to an of magnification and it extended through the magnetic structure so that test specimens can be lowered to the end and immersed in water.

This instrument produces a fluid frequency and fluid amplitude of the test specimens dissipated in the water, so that it is, essentially, a constant where the amplitude is variable in time of erosion. The device has been found to use some materials in a variable manner to the rotating arm test.

But, tests of many materials are not complete and it is not yet known whether it can be used for accurate evaluation of corrosion resistance of plastic materials.

Investigation of the new erosion problem is continuing at research institutions under Air Force sponsorship and at various aircraft companies.

High-speed photography is being used to study erosion action of droplets contacting the test specimens. The energy relations involved in interaction between specimen surface and the rain drops, fog, etc., are being studied, and methods for the purpose of determining the properties of the materials and necessary bond strengths.

And, to obtain service test data, accelerated specimens of various plastic materials are being attached to the wing leading edges of a large number of service jet engines.

All This ...

and **CORALOX** too!



- 1 Core center cap
- 2 Electrode holder
- 3 Retainer CORALOX: 5. The fastener disengages from center cap. 6. Retainer can trap between core holder and electrode base fastener. 4. Fastener disengages from center cap. 5. Fastener is engaged.
- 4 Metal gasket
- 5 Fastener, integral assembly
- 6 Metal gasket
- 7 Plastic center electrode tip 3/16" dia.
- 8 Seal core pin
- 9 Sealed oxygen monitor with electrical leads
- 10 Oxygen monitor with electrical leads
- 11 Copper wire, 1/16" dia. 12 Copper wire, 1/16" dia. 13 Copper wire, 1/16" dia.
- 14 Seal core pin
- 15 Seal core pin
- 16 Seal core pin
- 17 Seal core pin
- 18 Seal core pin
- 19 Seal core pin
- 20 Seal core pin

A full down higher-quality feature make the AC-181 the world's latest Aircraft Spark Plug—a better's down, when you include CORALOX, AC's patented fastener.

The AC-181 resists lead fouling better, changing in less "deadening" and less oil-schedule, creating—two of the principal reasons being, first, the superior CORALOX fastener and, second, the gas-retaining platinum electrodes.

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Pour & Whizzer and the CAA have approved the AC-181 for use of the big P & W engines.

Look at the technical drawing and see why the rugged AC-181 can save you time and money.

AC-181 FOR USE OF THE BIG P & W ENGINES



AC-181 Spark Plugs for Jet Engines have also participated in the establishment of many speed records.



## High Performance Wing Tested

Increased speed and payload claimed possible with airfoil and strut combination on French HD 10.

(McGraw-Hill World News)

Paris. The experimental prototype Hand Duxes 16, one of the most unusual and technically interesting prototypes developed in France since the war, has completed its test flights successfully.

In addition to the new wing design tried out on the plane, adapted to commercial transports, will cut operating costs to less than 13 cents per hour for payloads ranging from three-and-a-half to 40 tons.

• **Classified Study**—The HD 10 was built

to confirm the superior flying qualities of the extremely high aspect ratio wing based on unique struts patented by the Société Hand Duxes over the conventional cantilever wing. The low profile drag struts supporting the wing are aerodynamically designed to give extra lift, functioning as sort of auxiliary wings. Use of these struts is stated to make it possible to move this double aspect ratio without increasing the wing weight.

• **High Load Factor**—Hand Duxes on ground claim that with their design it

can now tolerate to stress factor of 23 lb. per sq. ft. with a wing loading of 41 lb. per sq. ft., or 32 lb. per sq. ft. wing loading with 11.6 lb. per sq. ft.

The company claims this new wing theoretically increases speed 33-40 percent and payload up to 200 percent for a given horsepower. The Ministry of Air has reported that flight tests of the HD 10 prototype have so far been considered away of these theoretical predictions.

• **Specifications**—The plane's characteristics are:

Span 104 ft., wing area 43.6 sq. ft., aspect ratio 12.3, wing chord 15.75 in. Weight empty 725 lb., weight loaded 1075 lb. Powered by Mothor 40-hp engine. Power loading 26.4 lb. Wing loading 23.2 lb./sq. ft. Top speed 120 mph, ceiling 13,000 ft. Fuel consumption 67 mi./gal.

These characteristics are said to put the HD 10 in its class and at very low power—16 hp. each stage up and 12 hp. with flaps down.

• **Applications**—The company claims that the HD 10 has demonstrated that its wing design can improve the performance of all types of subsonic aircraft. Here are some of the applications reported.

• **Small and medium transports**—Hand Duxes engineers claim their wing would permit building planes with a

total weight of 5,500 lb. and a payload of 1,900 lb. They estimate that even much lighter planes could operate for less than 13 cents a mile. Theoretically this cost could be reduced progressively as weight climbed to 40 tons. These results could only be obtained at cruising speeds of 160-200 mph. Greater speeds would disproportionately increase the operating cost and mean carrying less payload.

• **Long range military observation or transport planes.**  
• **Distances or altitude record breakers.**  
• **Present planes combining low horsepower with high speed.** One design suggested by the company is a (38-hp, five-seater cruising at 170 mph).

## New Device Analyzes Upper Air Samples

Use of an instrument called an "analytical air spectrometer" may lead to development of improved weather forecasting techniques for generating collection of data to be used in new studies of the composition of the earth's atmosphere.

The instrument analyzes gas molecules according to their weight and is being used by scientists at the Air Force Research Laboratory in Cambridge, Mass., to analyze air samples captured more than 85 mi. above the earth. The device was developed recently by the General Electric Co.

The high-sensitivity range of the mass spectrometer reportedly will aid in the study of reactions which meteorologists believe take place during the formation of the atmosphere in a much of absorption of radiant solar energy.

GE engineers say the instrument is so sensitive that under some conditions it can detect a gas which is only 1/100,000 part of another gas.

In operation, the gas to be analyzed is introduced into an ionization chamber where its molecular particles are given electric charges. The molecules then are accelerated through a magnetic field which changes their direction of movement.

The lighter molecules are deflected to a greater extent than the heavier ones. The results in the gas being spread across the instrument's collector plate in a molecular pattern according to their weight.

Since it separates molecules of different weights, or masses, the instrument is said to be useful in recording patterns of isotopes, particles which react chemically in the same way as others, but differ from them in mass and atomic structure. According to GE, scientists at the Cambridge lab will use the instrument to study representative gases isotopes which have not been discovered.

# 10 times

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1500 PSI HYDRAULIC  
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## For Vital Control Circuits in Curtiss Electric Propellers

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### ELECTRICAL CONNECTORS

### CHECK THESE ADVANTAGES

- Rotates freely
- High load capacity
- Easy assembly and disassembly
- Low resistance
- Single piece units
- Proven parts flexibility
- Vibration-proof
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Unfailing dependability is the standard set by Curtiss propellers and American Airlines in their selection of equipment. Bendix-Scintilla is therefore the logical choice for the electrical components in the Curtiss Electric propellers on American DC-3's. In fact, whenever you need a replacement for a Bendix-Scintilla electrical connector, you can be sure that you are getting the finest money can buy.

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Deep, thick, tough, long lasting wool nap. Strong convex back. Hole in center for mounting and clamping on holder—eliminates unbalanced operation and swirls—special feature. A wonder on patch work, blends new with old, completely fading patch. Produces a superior finish on all polishing, rubbing or waxing.

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No. 1200 gives correct speed—long life—dependable service. For easy and quick results get **Sioux**.

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For machine or hand polishing. Quickly cleans all surfaces and polishes in one operation. Restores original finish without injury to it or fine stripping. Contains no injurious ingredients. Our own scientific formula—based on years of research.

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## SALES & SERVICE

### Cloud Seeding Pays Off Out West

California Electric Power's surplus Lockheed P-38 induces snow in Sierras using dry-ice method.

Good altitude performance of the Lockheed P-38 makes it a star performer for California Electric Power Co.—which uses a surplus Lightning to seed snow clouds, thus increase water supply for its five power houses in the High Sierras. Data since started some 7.2 billion gal. over a 218-day seeding period, equivalent to 14,160,000 kw.

It cost CEP about \$200 per operational hour, including maintenance, to use the P-38. Flight average approximately 11 hr. Total costs run to about \$7500 for the equipment, whose status guarantee of the same power would have cost \$50,000. And Los Angeles also benefited through use of the extra drinking water after it had gone through the power house.

► **Why the P-38**—Originally the company planned to use silver iodide for seeding. But this method works best when it is used below clouds. And clouds hang low over Ridge-top Valley, CEP's new reservoir. So silver iodide was discarded because it was not available in large flying equipment.

The company switched to dry ice, dropped directly into the potential storm cloud. A plane with a ceiling of at least 10,000 ft. is needed to bombard clouds 15,000 ft. in depth hovering over a mountain crest averaging 15,000 ft. high. The P-38 and A-1's find were satisfactory because of their ceiling limitations.

CEP settled on the P-38, which it says has operated satisfactorily in all weather conditions encountered. Part of Robert F. Symons, holder of four U. S. and world glider records and who has flight commander of the U. S. glider training program at Wiley Post, Ariz.

### More Farm Strips Sought for N. Y.

Need for more forests experts in New York was emphasized by Claude B. Truitt, director of N. Y. State Bureau of Aviation at an address before a recent meeting of the state's Flying

Farmers at Cornell University. He asked members to participate in a plan to double the number of landing facilities in the state from 250 including 40 municipal fields, providing 250 100 additional strips in practically every sector.

► **Glenn All-Friday** and the bureau would help in coordination and planning of the fields and advice on suitable locations, drainage, providing wind data, and sale and regulation affecting airport location. Bureau suggests estimate that the cost of converting a strip of farm land into an airstrip with good natural drainage and reasonable approaches would cost a few hundred dollars. This would cover clearing a 1500 200-ft. and strip and removal of any obstructions or obstacles such as high trees.

► **An Air Market**—It was reported there are now 464 air markets throughout the state, and at the end of this year there will be 570. State department of conservation is planning a study plan whereby it will approve location and supply design and permit.

### Brazil Uses Copters

For DDT Spraying  
(McGraw-Hill World News)

Rio de Janeiro—The government's National Malaria Service plans to extend its DDT program into the Amazon valley this year.

Several helicopters, as well as ground squads, are to attack malaria in the states of Amazonas and Para and the territories of Amapa, Rio Branco, Acre and Guayana, all in the Amazon basin. About 180,000 houses and buildings are to receive direct applications of DDT.

### BRIEFING FOR DEALERS AND DISTRIBUTORS

► **OUT OF BOUNDS**—A new defense line of airplanes come to light in a recent United Highway Commission announcement that it will send any pilot along the highway in a landing strip except in an emergency. The commission also displays photos of "illegal highway vehicles."

► **NEW MANAGEMENT**—Emerson Corp., Dayton, maker of a portable electric news coverage, has been purchased by a Cleveland group. Alfred F. Marshall is the new president and treasurer. Ambrose E. Koch, vp, Harold A. Kline, vp and chief engineer, and Karl J. Eble in secretary. Vern K. Moseley is also associated in the new ownership. Mr. Marshall will handle general management, marketing, and distribution of all products.



### NEW OMNI TESTER FOR SERVICE CENTERS

This new National Amusement Corp. (NASC) T-3 set is sold to provide complete collection from any coin-operated machine without removing the wiring from the place. The set generates all the signal components of an actual situation. The sound track, which is transmitted, may be set on any timing by means of an accurately calibrated dial. For bench work, the test

apparatus produces all the necessary signals to permit complete adjustments of phase, location, and speed of the coin mechanism and VAK. Used with an oscilloscope, the T-3 tests an accurate check and under method record of the signal during its path through the machine coin equipment. Machine state T-3 can "externally monitor" the test.



... Because

## PROVEN QUALITY

is the Surest Index to Future Performance!



Whatever the Plane or Purpose...



#### PERFORMANCE

Every major airline today uses Bendix Radio communication and navigation equipment as preferred basic equipment, and many other airlines also use Bendix Radio equipment in all parts of the world.



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Boeing, Lockheed, Bendix Radio offers you the choice for ground line a single radio more, any type of equipment, or any combination of equipment—Bendix Radio Radio Radio a complete line of aviation radios.



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For the price of one Bendix Radio you get a radio, quality equipment at prices made attractive in every lot and every guarantee a good money-saver for you.



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In the present design program, Bendix Radio is engaged in looking to find answers to completely new problems. Bendix Radio Radio equipment in America's latest Air Force planes.

VHF Transmitters • H. F. Transmitters • Radio Control Pattern Antennas • VHF Communication and Navigation Receivers Indicators • Automatic Radio Composites • H. F. Receivers Marker Beacon Receivers • Inter-Communication Systems Lightweight Personal Plane Radios • Announcing Systems Ground Controlled Approach Landing Systems • Radio-Magnetic Indicators • VHF Omni-directional Range Systems



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P.S. One new H.F. VHF Omni-directional Range System is now in full production. Write for our two interesting books on the subject - Part 1 Operation - Part 2 Radio Technical.



## For the toughest glazing jobs *Safety Glass* BY PITTSBURGH

New requirements... for more adaptable transparent materials... for more advanced glazing methods... are a constant factor in aircraft production. Meeting these requirements—with new or improved products and now or improved techniques—is a constant factor in Pittsburgh's continuing aggressive development program.

On many types of military and large commercial planes you will find aircraft type Safety Glasses, transparent plastics, photo-graphic glasses, pressure bullet-resistant glasses and double-glazed Safety Glass, all developed by Pittsburgh.

In pilots' cockpits and bombards' compartments, new and different methods of joining multiple curved panels in such order and to the fuselage to a smooth finish surrounding help aircraft designers to approach the aerodynamic ideal and also report to the more smoothly flying and stronger than ever thus meet the structural requirements.

Our specialized equipment and constant research-plan the "know how" of men who have devoted their lives to making safety glass—in the disposal of all plane manufacturing, large and small.

When you are concerned with Safety Glass and glazing methods for airplanes, bring your problems to Pittsburgh. Pittsburgh Plate Glass Company, 2094-D Grant Building, Pittsburgh 13, Pennsylvania.



PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY



◀ The pilot's sight of the B-29 "Lady Luck" (shown by the cockpit view) is glazed with Pittsburgh Safety Glass. It is designed to protect the pilot from the pressure load and side pressure resistance, lower the glass is actually "safety" the pilot has indicated vision through glass even at extremely high angles.



◀ In the pressure cockpit of the B-29, the glass and control panels of the cockpit are glazed with Pittsburgh Safety Glass. It is designed to protect the pilot from the pressure load and side pressure resistance, lower the glass is actually "safety" the pilot has indicated vision through glass even at extremely high angles.



◀ One of the toughest glazing problems ever encountered was the windshield of the B-29. It was solved by Pittsburgh's use of double-glazed Safety Glass, which provides the pilot with a clear view of the cockpit instruments, while protecting the pilot from the pressure load and side pressure resistance.

## NEW AVIATION PRODUCTS

### Automatic Cabin Pressure Control

New Kollsman system, adaptable to any pressurized plane, keeps fixed relation between outer and inner air.

A new aircraft cabin pressure control system that automatically maintains a fixed relationship between cabin altitude and outside altitude is being shown to airplane engineers by Kollsman Instrument Division of Sperry D Co.

The Elmhurst, N.Y., firm is stressing three advantages:

- Completely automatic operation. But manual controls are provided to the crew in most normal conditions.
- Adaptability to the altitude of all performance ranges with only minor component changes.
- Design that avoids tobacco and other smoke tar problems. Permanent controls, potentiometers and sensitive electrical contacts used in present equipment have been replaced by an electronic electrical system which operates on 400 cycle ac current.
- Lightweight, compact and easily installed. Simplicity of component makes maintenance easy and low-cost. Initial cost also is moderate.

Prospects—Two major airlines, according to Kollsman, already plan to check out the new system this summer in flight testing specially selected flights. While the system itself is new, its components—potentiometer, sensitive electrical switches and motor—are standard Kollsman products which are "thoroughly proved" and "can be made available for as early as late 1954."

As an additional plus, Kollsman expects that the basic principle of the new system already is tested and proven. It is similar to that used in the D-55, but the D-55 equipment, also a Kollsman development, is "much more complicated and requires more pilot control," according to Jack Anderson, chief electronics engineer at Kollsman. And the D-55 is not as specifically designed for easy installation in other craft.

Weight—Total weight of the equipment is less than 20 lb. by a system consisting of three main units, a Constant amplifier incorporating amplifier components of the system, a cabin altitude selector (manual control), and a valve motor unit.

That it is 20 lb. with the weight of other types of cabin pressure control systems, Anderson says. But, he adds, the new system promises to make this control unit its own weight by cutting down on the amount of metal during now required.

Important features of the equipment are three Switchcraft actuators, developed by Kollsman, which measure respectively the cabin altitude pressure, the outside altitude pressure and the pressure difference between them.

Design Feature—This cabin pressure control is based on the premise that there should be a fixed relationship between altitude at which the plane is flying and the pressure maintained in the cabin. Total of air delivered to the cabin pressure will decrease as altitude increases. The new system promises to make this control unit its own weight by cutting down on the amount of metal during now required.

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of the altitude at which the plane is flying, but still is subject to rate-of-change and differential pressure limitations.



### Trim Tab Control

Improved Trim Tab entry system, designed by Airborne Acoustics Corp., 25 Montgomery St., Hillside 5, N.Y., has been redesigned to meet compact size weighing 25 lb.

Designed to control auto take in "last second" use can be installed in wing and connected to tail through single link. It produces 310 in. lb. operating torque through 180 deg. maximum rotation and conforms to all applicable specifications: AN-M-40, AAP 80251 and TN TRES-1. Space capacity exceeds 1500 in. lb.

Actuator incorporates auto backlash output, magnetic brake, helical clutch, adjustable brake torque, 700 lb. explosion-proof reversible motor, position indicator—1000 gals. per hour flowmeter (internally adjustable), and built-in auto stop filter. Units are available for controlling such actuators with a joint vent to permit "dialing" the setting without vibration and to eliminate need of providing a position indicator.

Actuator comes in two models, CR-415 (top) and CR-412 (bottom), having identical performance, but featuring different mounting dimensions to meet varying installation requirements. Dimensions of both units including support shafts and electric receptacle on CR-412 are 6.5 x 1.8 in.

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## Bags Protect Parts

Fluorinated and moisture-proof bags, designed to protect parts with rare element sensors, tools, delicate instruments, controls, and smaller items while in storage or in transit, have been developed by the Morton Bag Co., 1145 W. 117 St., Cleveland, Ohio.

They are available in wide range of sizes and in different combinations with printed trade marks, serial numbers, parts numbers, shipping instructions, order numbers, etc., to meet individual requirements.

Bags are fabricated in polyethylene only, polyethylene laminated in foil or kraft, and polyethylene laminated in cloth-backed foil. They reportedly will not support the growth of mold, are non-toxic, and are not affected by ultraviolet light, changes in humidity, salt water, active solvents and dilute or concentrated acids such as sulphuric, hydrochloric and nitric. Bags stay flexible down to temperatures of -40°C, according to maker.



## Wash Basins Aloft

Lightweight plastic wash basins for transport aircraft are offered by Double Fanned Product Inc., 229 Canal St., New York, N.Y.

Made of fluted, chlorinated-fabric or fiberglass, units are implemented into jet, ship, and train, and are guaranteed to withstand boiling water without damage.

Wall type basins, No. 701 (bottom) weighs 2 lb. and measures 14 1/2 x 12 1/2 x 5 in. No. 702 vanity-racer type (not shown) weighs 5 lb., measures 17 x 11 x 6 in. Dimensions of recess basin (top) No. 401, are 14 1/2 x 15 x 5 in., while weight comes in 2 lb. Specialty light-weight models, not shown, in No. 300 weighs 1 1/2 lb. and is 11 in. long, 14 in. wide and 5 in. deep.

Basins are available in three colors: pastel pink, green, blue and standard white.



The maker reports Northwest Airlines is first purchaser of the new basins. The owner will use them in its Boeing Stearman operations.

Heater is fully automatic and has capacity of 250,000 lbs./hr. at temperature rise of 168°F. It delivers 2000 to 11,000 gals/hr. at 6 in. water gauge static pressure. Unit normally burns natural gas but can be adjusted to take kerosene or light fuel oil. It is powered by 28½-hp electric motor, weighs 800 lb., and is mounted on three wheels, rubber tread treads to facilitate use on hard floor.

Warm or is transmitted by high speed, centrifugal blower through air vanes to aircraft. Nelson reports it now is developing evaporative cooler which can be attached to GT-1000 to keep passengers comfortable during hot weather.



## Checks Inverters

For testing high capacity aircraft inverters, Giant Inverters, Inc., 474 184th St., Brooklyn, N.Y., has developed Model AI-1 inverter test stand.

Unit has full microcirculation and makes it possible to run complete panelization and after-overhaul checks on latest type inverters.

It provides balanced 3-phase loading from 0-1000va. at 120v., 400c, single phase loading from 0-2000va. at 125v., 400c, single phase loading from 0-250va. at 20v., 400c. Tester also provides automatic overload protection, motor locking d.c. supply and cooling fan or coils, and automatic overhauling protection for test stand itself.



## Preserves Food

Newstyle cold food storage cabinet for DC-3 aircraft has been placed on market by Treue Engineering and Mfg. Co., Elkhart, Texas.

Cabinet is made of aluminum alloy and features herringbone pattern on door. It is completely sealed and is isolated throughout with Fiberglas Unit master 12 mm. and weighs 25 lb. It is 13 in. wide, 16 in. deep and 38 in. high.

TENCO reports an initial order for 200 of the new food locker already has been placed by American Airlines, which set up original design specs.



# *Yours for better bearing protection*

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various lip designs that provide a choice of bearing surfaces, the wide range of flanges that increase design freedom and permit important corrections in machine tolerances.

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spools... and for many other special conditions.

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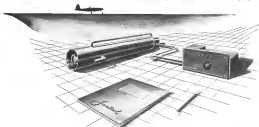
## how to keep a gas tank from getting any

## HOT IDEAS

Combustion—like any other combustible material—demands oxygen when it burns. So it has long seemed like a good idea to keep oxygen out of carburetor fuel tanks and thus keep gasoline's friend air out of a potential enemy.

Good theory, but how to apply it has escaped a good many engineers. Now, from our laboratories, comes a preliminary answer: a very rudimentary but proven to furnish "pump gas" (oxygen-free gas) to fuel tanks—and then, of all things, to allow the best way!

A lot of Budco Combustion's hard earned how to do-it experiment went into this gasoline design how to ensure proper ignition, how



to maintain a constant fuel-air ratio at all altitudes, how to keep the "pump gas" dry and free of oxygen, how to store safely under all conditions—and how to do all this in a 1½ weight, compact system.

Many of these problems were not new to Budco Combustion engineers—many already solved in the development of aircraft breathing apparatus that has spread with the world over. They were first seen also developed with the ever-growing expansion of it, and make an important contribution to aviation progress.

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## AIR TRANSPORT

Route	Air France	British Airways	Continental	Delta	Eastern	Northwest	Pan Am	Trans World	United
BALTIMORE-WASHINGTON	100	100	100	100	100	100	100	100	100
CHICAGO-MILWAUKEE	100	100	100	100	100	100	100	100	100
NEW YORK-PHILADELPHIA	100	100	100	100	100	100	100	100	100
BUFFALO-NEW YORK	100	100	100	100	100	100	100	100	100
DETROIT-CLEVELAND	100	100	100	100	100	100	100	100	100
CHICAGO-INDIANAPOLIS	100	100	100	100	100	100	100	100	100

OVERALL SPEED of top dogs but when ground speed is reduced. Section based.

Route	Air France	British Airways	Continental	Delta	Eastern	Northwest	Pan Am	Trans World	United
BALTIMORE-WASHINGTON	100	100	100	100	100	100	100	100	100
CHICAGO-MILWAUKEE	100	100	100	100	100	100	100	100	100
NEW YORK-PHILADELPHIA	100	100	100	100	100	100	100	100	100
BUFFALO-NEW YORK	100	100	100	100	100	100	100	100	100
DETROIT-CLEVELAND	100	100	100	100	100	100	100	100	100
CHICAGO-INDIANAPOLIS	100	100	100	100	100	100	100	100	100

BOOSTS OVERALL COST by adding too on two fee to usual plane fare

## 'Slow' Helicopters Save Time

Eastern's chief engineer suggests rotorcraft be used for short-haul, inter-city transport operations.

A top airline engineer has challenged the long-held belief that an airplane is necessarily the fastest way to get from one city to another. On a point-to-point basis, he says, a helicopter is faster than a jet, says Eastern Air Lines' Chief Engineer Charles French, the airplane is not always the answer because the city-to-airport ride takes so long.

So he suggests that for short-haul routes only air travel the transport helicopter is the faster and cheaper vehicle for the transport "helicopter" route, who spends nearly as much time in surface travel to and from airports as he does in the air.

Observers see two important things in French's analysis. The helicopter generally has been disregarded in inter-city transport air travel because of its lack of speed compared to an airplane. It is a slow craft. And French is the chief engineer of the airline that you see in and you see how fast the plane can be.

► **Yug Sluggish.** The airplane's slow transportation time advantage for type of

more than 100 miles. But even conventional faster services are not the only ones. Now the helicopter who wants convenience and speed in transportation on the 96-mile run from New York to Philadelphia, the 101-mile run from Detroit to Cleveland, or the 40-mile flight from Baltimore to Washington.

Look at the chart above, prepared by French to illustrate a paper delivered before the recent Fifth Annual Flight Progression Meeting at the Institute of the Aeronautical Sciences in Cleveland. They show that even a proposed express helicopter will cut the surface travel time problems only moderately.

► **Fast for Express.** On 11 Airports, Board Chairman Joseph J. O'Connell, says, and it is reasonable to see the air travel's total cost. French's plan gives transportation time changes. French's chart shows that overall cost would cut to between about 7 cents and 91 cents per mile. Yes, the value is getting only about the same, but the difference going to ground transportation.

Either way, it puts the real field far further air transportation expense in the short-haul market. French looks at it this way.

"There appears to be a growing recognition that if we are to continue to handle our local and border air service, the airplane may not be the most economical type of aircraft to use," he said.

"With the advent of large-size helicopters, and their increasingly reliable operation, (these ships) may eventually replace land-based aircraft in our more densely populated areas because of their ability to land and take off close to the traffic generating area."

► **Time and Cost.** French said a study of the overall speed of air travel for distances of less than 300 miles reveals that it is somewhat slower than other means of surface travel, and substantially higher in cost. This is particularly true when the airports are located far from the cities they serve, either due to city use or terrain restrictions.

On a purely airport-to-airport basis, the helicopter is faster than conventional transport only for distances of less than 100 miles. However, French pointed out that an overall speed analysis of typical route flights between six sets of cities (using the best two engine performance today) shows an average overall speed of from 32 to 71 mph for distances varying from 32 to about 151 miles.

As the chart shows, the airport-to-airport distance between New York and Philadelphia is 96 miles. Flight schedule time is around 40 minutes, and black-top-to-top speed is a respectable 144 mph.

► **Ways Time Is Lost.** That the picture deteriorates when the 100 miles of ground transportation between city and airport is added. French's analysis is taken into consideration. Total ground time is 1 hr 10 min, and the average rate of speed of the ground transportation is less than 15 mph.

That the entire 113-mile trip from the center of New York to the center of Philadelphia by conventional airplane and surface transportation requires 1 hr 10 min, and the overall speed is cut to only 57 mph. By contrast, French estimates, a helicopter traveling from city center-to-city center could make the New York-Philadelphia flight at an average speed of 70 mph.

► **Fast, Then.** You get the same determining effect when you study the air travel's total cost. French's plan gives transportation time changes. French's chart shows that overall cost would cut to between about 7 cents and 91 cents per mile. Yes, the value is getting only about the same, but the difference going to ground transportation.



At French ports it "decides being faster for distances up to approximately 100 miles, the helicopter permits an increase in average airframe speeds to at the present time given to ground transportation."

► **The Vehicle**—It is the type of helicopter that the U.S. military thinks could replace this service for the future.

► **Capacity**—25-35 passengers, 2000 lb. of fuel and cargo

► **Cruising speed** 95-100 mph

► **Weight and price** 10,000-12,000 lb., cruising payload is 75 percent of gross weight, price would be in the neighborhood of \$750,000

► **Cost and fuel** \$1.30 per mile operating cost on basis of 55 mph cruise speed and 1500 hours per year utilization would bring the cost to about 45 cents per mile, assuming no load or cargo revenue and 100 percent load factor

At Los Angeles, the proposed FBO on the 500 kc. dispute. The pilot argued that because of the danger of ditching, all available safeguards should be required.

Radio telephone has been used exclusively on U.S. domestic airlines for 10 years. But differences in language have made radio telephone essential in some parts of the world.

## Airline Crew Blamed In Lightplane Crash

Crew of a Capital Airlines DC-3 has been blamed for a mid-air collision in which the transport struck a Cessna 140, destroying the lightplane and killing the pilot.

The accident occurred last Aug. 7 near Marlboro Lake Forest Airport, Md., where the DC-3 was on a flight to Washington. No one aboard the DC-3 was injured, although the crash was discussed substantially. A section of the DC-3's right wing, about 6 ft. ahead from the wing tip, and a portion of the right stream were torn away.

Chief Weather-Aid, Communications Report says the accident was probably caused by failure of the DC-3 pilots to see and avoid the Cessna. Weather was clear at the time, and visibility was 15 miles.

The DC-3 was descending in a shallow left turn while crossing Marlboro Airport at an altitude of 1200-1500 ft. and at 160 mph. The Cessna was ascending a steep climb from the ground and to the right of the DC-3. Vision of the lightplane pilot was obscured by his ship's left wing through the left turn which preceded the accident.

Pilot of the Cessna reportedly was conferring to the Marlboro airport radio pattern and was looking to get aboard CAA and that because it was Sunday afternoon, with more than average traffic in the Marlboro area, the DC-3 pilots should have exercised the highest degree of alertness for other aircraft.

## Air Guard is Fighting CAA Airport Ban

An National Gardeners are quietly circulating a petition, signed by 100,000 people, to force the CAA to repeal its ban on general aviation aircraft from municipal airports. The petition is being signed by citizens and municipal governments and is being circulated in many states.

That is CAA's interference with the right of the public to use the airports. They pointed out that they had been using the airport for the air-traffic expanded use of radio telephone anyway, and that the CAA's recent action at least gives them something tangible to hold on to.

## NOW 14 CONVERSATIONS CAN BE RECORDED AT ONE TIME!



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### A BRUSH ACHIEVEMENT

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play back. Easy to take off wanted conversations for permanent or semipermanent record.

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## CAB Straddles on 500 kc. Issue

Board agrees that low-frequency emergency facilities are helpful, but doesn't say how they should be used.

Ability to shift to the 500 kc. band for radio telephone distress frequency probably will be made mandatory for U.S. airlines transporting flying a number of long, over-water routes.

The Civil Aeronautics Board has been studying and highly-qualified exponents to the low-frequency emergency facilities which the main class of the airlines consider almost worthless. But just how the CAB will go to implement its decision on 500 kc. with new safety regulations is a lively topic of speculation.

The 500 kc. issue was dropped in the Board's last year after a CAA was time consumed and the Flight Radio Officers Association to Congress that the current were postponing its safety by shifting from radio telephone to radio telephone on a number of routes, including the West Coast. The airlines replied that CAA had endorsed the shift and added that the action apparently were trying to use fear-mongering tactics which were designed to keep flight radio officers in their place.

But in 50,000-hour airline flights showed that in 50,000 commercial commercial crossings during the past 10 years there have been five instances of planes being ditched in the water where they would require aid from nearby searchers. Besides, they declared, a plane in distress would talk to shore stations via radio telephone, and the message would be relayed to the ships at sea.

Even with two engines dead, a pilot will try to get his plane to the nearest land rather than try to ditch near a ship, the critics observed. "If there are all four engines go out, at the place where it becomes unwarranted, the crew could be in trouble," said the critics and probably would be of little use."

► **Help in Emergencies**—CAA officials replied that a plane needs to contact a surface vessel the requirement usually is of the most urgent nature. Such a situation, they assert, requires direct plane to ship

communications and a base (concerning relay to shore stations).

In its decision on 500 kc., CAB said that in an emergency the most rapid and effective means of alerting the ground organizations is through use of radio telephone, radio telephone. But it noted that a system of continuous transmission through the ground organization to ship stations involves "extensive partial limitations which make it difficult to return some positions for direct ship-to-ship radio under distress circumstances."

The 500 kc. frequency, CAB admitted, possesses technical limitations in its application, in aircraft which would be less reliable than higher frequencies. The Board emphasized, however, that that radio telephone frequency is the only presently available means to assure direct communications immediately between several and surface vessels.

► **No Operator Needed**—Proponents of the services of a fully-qualified flight radio officer may be made on board the plane to make direct communications on 500 kc. CAB said instead. "A fully-qualified radio operator is not possible solely on the basis of a requirement for distress communications."

"Aircraft communication equipment should be so designed and installed as to render it readily available for emergency communication on 500 kc. in the most efficient manner practicable. The skill and knowledge requisite for use of 500 kc. under emergency circumstances should be possessed by those crew members who would, in case of emergency, be most available for such a function."

► **Partial Victory**—Members of the Flight Radio Officers Association see the CAB decision as a step in the right direction. They pointed out that they had been losing the fight against the airlines' expanded use of radio telephone anyway, and that the Board's recent action at least gives them something tangible to hold on to.







5

## Truman, Finletter, and Air Power

President Truman's nomination of Thomas K. Finletter as Secretary of the Air Force is a good omen. So is Mr. Finletter's acceptance. Both appear to indicate air power is rising in Washington's political barometer.

Mr. Truman must know well by this time that he has made a bet of rebuilding and modernizing air power and that Gen. Eisenhower's strong plea on Capitol Hill the other day for a better Air Force is more than the merest words of an earnestly respected military man. It is also a clue to the temper of public opinion, and a catalytic agent to act against working to expunge itself.

Mr. Truman knows that Mr. Finletter took some "bitter" before he would consent to succeed to Mr. Symington's vacated chair in the Pentagon. And he must know Mr. Finletter is not the kind of man who backs down on his own principles so carefully formed.

Mr. Finletter handed what has been described many times—both in and outside aviation—as one of the most distinguished groups of aviation fact-finders in history. That group's final report, titled "Survival in the Air Age," made careful recommendations for the kind of air protection the nation needed. Mr. Truman created the committee and selected Mr. Finletter to run it. The report was hailed by everyone except Mr. Truman. Up to now he has ignored it.

Finally, however, Mr. Finletter's selection seems to indicate we are making progress. It is high time. Steady deterioration of U. S.-Russian relations, steady expansion of Russian influence and the Russian atomic bomb, make "Survival in the Air Age" a far more critical problem now than in January, 1948, when the report was presented to the President.

It now appears that when the House of Representatives returns Aug. 18 from its Easter recess it will be called upon to make still another decision affecting our possibilities of surviving in the air age. Shall we keep on "reconquering" at the expense of U. S. air power, morale and money, or shall we put up funds to support even a 49-group Air Force and an adequate Air Navy?

Mr. Truman must know the temper of Congress. And of the people. Maybe he is repeating history. When he announced in 1947 that he was appointing a special fact-finding committee to advise him on the best possible present air protection, he was deliberately snatching the initiative from Congress, where just such a committee was being organized. Such a group was formed, and made its report, but the President's nomination took the spotlight, did a better job, reported first, and got most of the publicity.

Now, with nomination of Mr. Finletter, it appears Mr. Truman again is grabbing the initiative.

A key to the Administration's procedure may be provided by the Joint Chiefs of Staff in recommendations which Secretary Johnson has recently consulted himself to accept. Since both Air Force and Navy leaders have already testified to Congress that the present procurement is inadequate even to preserve a modern Air

Force and Air Navy in status quo, it seems logical that the Joint Chiefs will make the same recommendation, for additional funds. However, it appears at the Pentagon now that the JCS decision may not be announced until late April or early May.

On Capitol Hill there has been introduced an amendment offered by Rep. Carl Vinson, chairman of the influential House Military Affairs Committee, calling for \$585 million additional for aviation procurement. This would make \$200 million more available for USAF, now held to \$1350 million, and \$383 million more would go to the Navy for aviation, currently held to \$633 million in the fiscal 1951 budget.

Analysis of the 1951 level, without Vinson's additions, as presented by Air Force and Navy before Congress, shows a steady decline in modern air power.

• USAF—At a continuing level of \$1350 million a year, the Air Force would deteriorate to an estimated 35-42 groups of modern planes by 1954-56. If the even lower \$1.3-billion procurement level of 1950 were continued, USAF would have 34 modern groups by 1955-56.

• Navy Air—If the \$633-million level continues, which is dated to buy 817 planes in 1951, the current operating strength of 6233 planes (4389 regular and 1844 reserve) would shrink to about 3000 planes in 10 years.

Obviously, USAF and Navy want the Vinson amendment if Truman and Johnson will let them have it, because Vinson's additional program is based on Joint Chiefs of Staff basic planning.

Indication now is that primary emphasis in the procurement that would be made possible by the Vinson amendment would be for tactical support and transport aircraft for the USAF, and for shipboard fighter-bomber types for the Navy, all aimed at meeting defenses as tactical air support planes.

Vinson's amendment is not designed to step up procurement toward the 70-group level again. Apparently air power needs have dropped that figure, however desirable, as probably unattainable in the present Administration. All that is proposed to do with the \$585-million addition is to prevent further shrinkage.

Some Washington sources see a possibility that even money could be made available almost immediately for procurement, if President Truman would rebuke enough from that 1950 fund of \$551 million he imposed so that he could get the program underway before Congress could take action.

This move would recognize the initiative for the Executive Department. And the money which was scheduled in 1951 fiscal year spending could be replaced for the 1953 budget by passage of the Vinson amendment in due course.

So it looks now to the staff of ARMYCOW WEEK as though chances are better in Washington than they have looked for many months for sufficient added money to preserve the minimum 49-group Air Force and Naval air power in modern status quo. —Robert H. Wood



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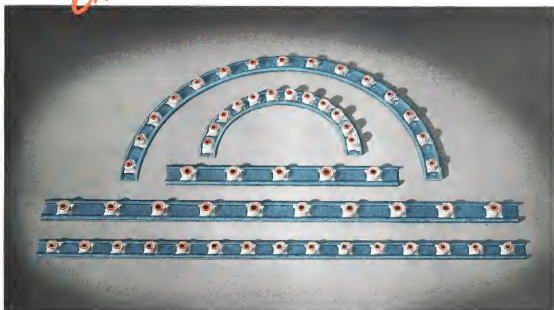
cooperation and encouragement of All-Weather Flying Division, USAF and the Air Transport Association, the gyro-scope is an example of Sperry's never-ending search for new and better ways to improve flying techniques.

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### —New High Strength 24S-T4 Aluminum Alloy Channel Strip—Colored Blue for Easy Identification!

During production, mis-alignment of sub-assembly components can result in twisted channel strips—or nuts pushed out. This is particularly true in such applications as access covers and panels. Therefore, to promote additional production line economy and to further simplify time-saving multi-unit nut installations, ESNA developed their new 24S-T4 gang channel strips.

The extra tough aluminum alloy used for this new product provides additional strength for these unusual assemblies . . . and a new method of cut and raised dimpling retains the nuts securely, and prevents over-riding.

In addition, the new ESNA gang channel features a Nylon Locking Insert that assures *reusability* for over 100 applications. This means tremendous savings in maintenance costs. Why? Because access covers, panels and similar components are regularly detached to permit inspection or repairs. Formerly, nut strips used on these assemblies had to be replaced, because of the high re-use factor. Now, however, the new ESNA

Gang Channel Nuts, with the nylon red elastic locking collar, guarantee long range maintenance economy — the *self locking torque is assured for the life of the aircraft*. And like all Elastic Stop Nuts, they protect fastenings against vibration . . . impact . . . and shock! The famous nylon red elastic collar keeps bolt and nut threads rust-free, seals against liquid seepage . . . and is RE-USEABLE . . . OVER ONE HUNDRED TIMES!

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